8

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Attn Intellectual Property Counsel
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EXAMINER	
JONES, HUGH M	
ART UNIT	**PAPER NUMBER**
2128	4

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

8

Office Action Summary	Application No. 09/501,445	Applicant(s) CAO ET AL.	
	Examiner Hugh Jones	Art Unit 2128	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 10 February 2000.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-13 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-13 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-13 of U.S.Application 09/501,445 filed 2/10/2000 are pending.

Claim Interpretation

2. The broadest, most reasonable interpretation has been provided to the claims. The claimed invention appears to be directed at ray tracing based seismic modeling and analysis.

Information Disclosure Statement

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

4. In particular, reference is made to GeoFrame (throughout the specification) and the publications listed on lines 29-32, page 7, specification).

5. Please provide, in the next response to the Office, the documents as discussed because they are material to the patentability of the claims. Furthermore, please provide any user's manuals to related Schlumberger software products, including GeoFrame and GeoStore. Applicants are reminded of their duty to disclose as per 1.56.

Specification

6. The apparent improper attempt at incorporation of essential material in the specification by reference to a foreign application or patent, or to a publication is improper. See *In re Hawkins*, 486 F.2d 569, 179 USPQ 157 (CCPA 1973); *In re Hawkins*, 486 F.2d 579, 179 USPQ 163 (CCPA 1973); and *In re Hawkins*, 486 F.2d 577, 179 USPQ 167 (CCPA 1973).

7. Mere reference to another application, patent, or publication is not an incorporation of anything therein into application containing such reference for purposes of disclosure required by 35 U.S.C. 112; the purpose of "incorporation by reference" is to make one document become a part of another by referring to the former in the latter in such a manner that it is apparent that cited document is part of referencing document as if it were fully set out therein - In re Serversky 474 F.2d 671, 177 USPQ 144 (CCPA 1973):

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> **The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.**

9. Claims 1-13 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claimed method, including the model and its

implementation do not appear to be supported by the specification. The specification appears to rely on essential matter for support – the essential matter was not incorporated by reference.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

11. A person shall be entitled to a patent unless –

> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

12. Claims 1-13 are rejected under 35 U.S.C. 102(~~b~~a) as being clearly anticipated by Thomsen.

Thomsen discloses a method for processing converted-wave data into interpretable images using a compact two-parameter model. The method broadly comprises the steps of: collecting both P-wave and converted-wave seismic data; identifying the arrival times of the P-wave and the

converted-wave data; computing the vertical velocity ratio from the arrival time data; computing the moveout velocity ratio from the corresponding moveout velocities; computing the effective velocity ratio from the vertical velocity ratio and the moveout velocity ratio; and computing the conversion point from the short-spread P-wave moveout velocity for each reflector, from the effective velocity ratio, the C-wave moveout velocity ratio, and from the arrival time data. See fig. 5-8, 10-12 and corresponding text.

13. Claims 1-13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Carrazzone et al. or Jones et al..

Carrazzone et al. disclose a method for deriving reservoir lithology and fluid content for a target location from pre-stack seismic reflection data. The method uses inversion of pre-stack seismic reflection data for both the target location and a calibration location having known subsurface lithology and fluid content to derive the subsurface lithology and fluid content at the target location. The inversion process is preferably a viscoelastic inversion to account for the effects of friction on seismic wave propagation. The results of the inversion process are a set of subsurface elastic

parameters for both the target and calibration locations. Relative magnitudes of these subsurface elastic parameters are compared, together with the known subsurface lithology and fluid content at the calibration location, to derive the subsurface lithology and fluid content at the target location. Carrazzone et al. further disclose the ray tracing, velocity and density features. See fig. 1-2, 5 and corresponding text.

Jones et al. disclose that features of subsurface earth reservoirs of interest are made available for analysis and evaluation by forming three-dimensional, geologic block models based on field data. The field data include geological observations, such as lithofacies and porosity values obtained from well data and other sources, as well as geophysical data, usually from seismic surveys. The geologic models representative of subsurface reservoirs so obtained are optimized to match as closely as feasible geologic constraints known or derived from observed geologic data. The models also conform to geophysically based constraints indicated by seismic survey data. The modeled geologic lithofacies and porosity are converted into acoustic velocity and bulk density values, which are then formulated as a seismic response which is then

compared with actual seismic data. A perturbation process on lithofacies and porosity can be iteratively repeated until a representation of the reservoir is obtained which is within specified limits of accuracy or acceptability. See fig. 1, 3, 5 and corresponding text.

14. Claims 1-13 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Assa et al. or Meyer et al..

Assa et al. disclose a method, computer system, and computer program for analyzing geological data stored on computer-readable media, including organizing the data to represent a plurality of sub-regions and a feature, and classifying the feature into a subset of the plurality of sub-regions. The method, computer system, and computer program analyze geological data stored on computer-readable media, including organizing the data to represent a plurality of sub-regions, and editing the sub-regions. The method, computer system, and computer program analyze geological data stored on computer-readable media, including organizing the data into a database, which includes a geometry part and a separate design part. The method, computer system, and computer program includes preserving the shape of a feature during classification and editing. The method, computer system, and computer program

organize geological data to represent a region and subdivide the region into a first sub-region and a second sub-region with a boundary at a first location. The method, computer system, and computer program analyze geological data stored on computer-readable media, comprising organizing the data to represent a plurality of sub-regions; attaching a material property to each of the plurality of sub-regions; editing one sub-region of the plurality of sub-regions to produce a second plurality of sub-regions; and propagating the material property from the one sub-region of the plurality of sub-regions to the second plurality of sub-regions. They also disclose GeoFrame. See fig. 1-2, 7, 16-18 and corresponding text.

Meyer et al. disclose a method is described for providing improved seismic data to a driller to indicate position and spatial extent of a drilling target which may be up to several hundreds of feet ahead of a drill bit. In one embodiment, the method includes the steps of: survey design and data modeling, and definition of a drilling target point and a drilling interruption point; drilling down to a depth at which drilling will be interrupted; interruption of drilling; look-ahead borehole seismic survey (VSP); continuation of drilling; data processing and

interpretation; coordinate update for optimum target intersection; and steering of drilling by borehole seismic data interpretation. See fig. 3, 5-7 and corresponding text.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following art is cumulative and reads equally well on the claimed invention:

- **Bunks et al.** disclose method for reducing the time, cost and apparatus required for monitoring the geometry of the oil/water, oil/gas, or gas/water interface in an underground reservoir. By strategically placing sources and sensors, and by fixing the sensors to the solid earth surface beneath the water, and by knowing the velocity fields in the overburden, the changing edges and geometry of the oil may be determined with significantly reduced data gathering. The strategic positions of the sources and receivers is determined by referencing to the known geometry from past surveys. In addition the velocity of the overburden is known by these prior surveys. In addition, higher resolution of reflectivity areas is achieved by use of sound

sources capable of generating higher frequencies compensated for the earth's attenuation and by utilizing long integration times to improve signal to noise ratio. These sound sources can be smaller than prior art sources since they provide directed beams of narrower widths. Smaller computers may be used for analyzing the reduced data collected.

- **De Hoop et al.** disclose a method for determining the anisotropic properties of an unknown earth formation by means of seismic exploration includes generating seismic signals for propagation through the unknown formation. A range of seismic data samples generated by the propagation of the signals through the unknown formation is detected, and the detected samples are affected by the anisotropic properties of the unknown formation. A group of postulated anisotropic properties which would cause known perturbations in seismic signals are selected for the unknown formation. The detected range of seismic data samples from the unknown earth formation is compared with estimated ranges that could have been produced by seismic signals propagating through earth formations made up with differing weighting of

components of the postulated anisotropic properties. The estimated range that best matches the detected range is identified, and the related weighted components of the postulated anisotropic properties are attributed to the unknown earth formation.

- **Hornby** discloses methods for determining the axial and radial slowness of a formation traversed by a borehole via utilization of sonic data obtained from a sonic borehole tool having a plurality of detectors. The methods utilize first arrival time information, ray tracing techniques, and backprojection techniques. The differences between the actually measured first arrival times and the theoretical first arrival times as calculated by ray tracing through an initial slowness model of the formation, are backprojected along the theoretical ray paths of first arrival in order to modify the initial slowness model of a formation. The methods utilized are preferably iterative, such that the modified slowness model is then utilized for additional ray tracing and backprojection. Secondary arrivals may also be utilized to refine slowness determinations made from first arrival information.

- **Lu et al.** disclose a method, computer system and computer program for interactively constructing, editing, rendering and manipulating geoscience models including aggregating the functionality of a geometry system and a graphics system, enforcing consistency between the geometry system and the graphics system, and interfacing the geometry system and the graphics system to an application through an integration layer. Lu et al. further disclose GeoFrame.

16. Any inquiry concerning this communication or earlier communications from the examiner should be:

directed to:

Dr. Hugh Jones telephone number (703) 305-0023, Monday-Thursday 0830 to 0700 ET, ***or*** the examiner's supervisor, Kevin Teska, telephone number (703) 305-9704. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist, telephone number (703) 305-3900.

mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 308-9051 (for formal communications intended for entry)

or (703)308-1396 (for informal or draft communications, please label "*PROPOSED*" or "*DRAFT*").

Dr. Hugh Jones

Primary Patent Examiner

February 22, 2004

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